

# Weather 101: The NWS Basics

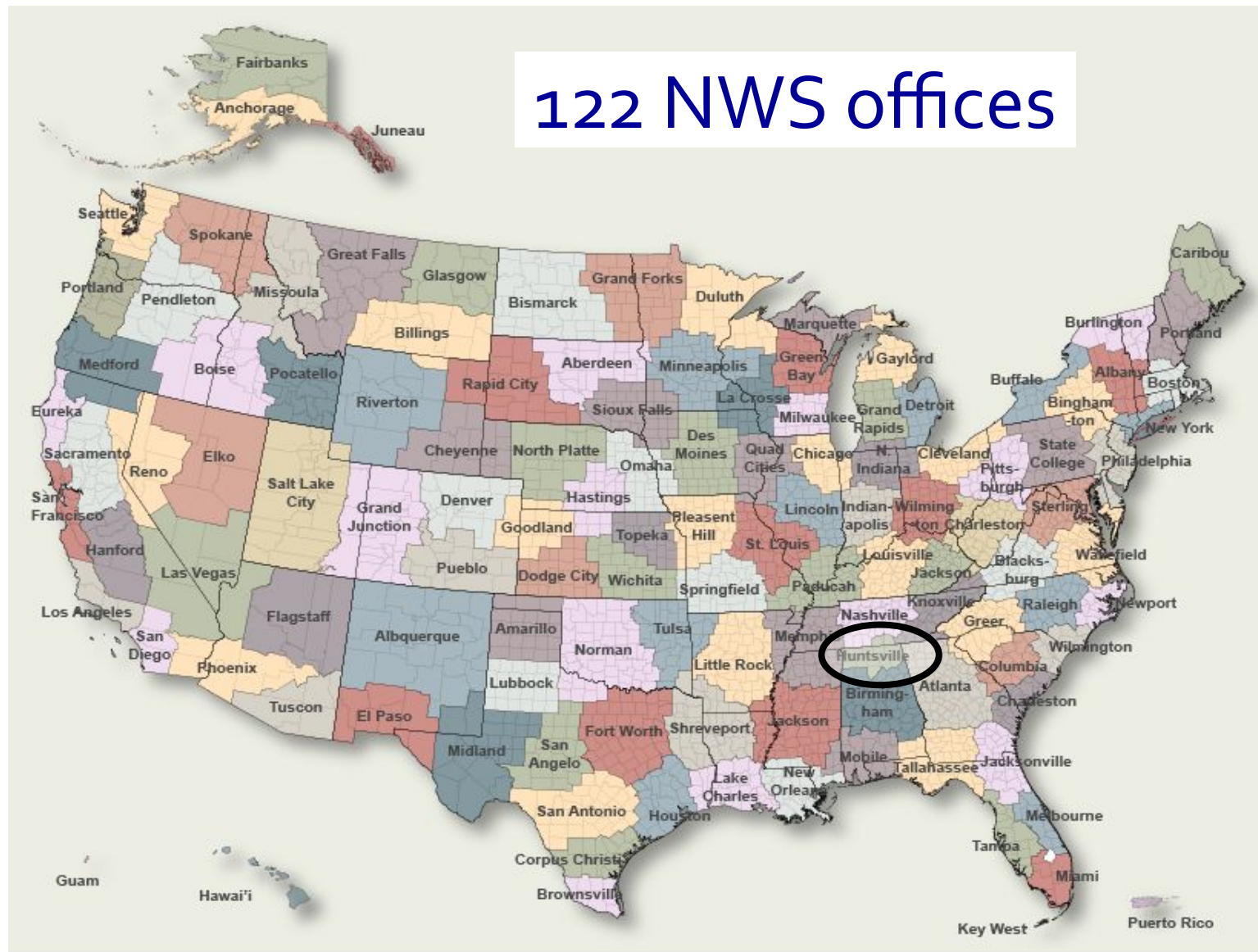
Jessica Chace

Warning Coordination Meteorologist

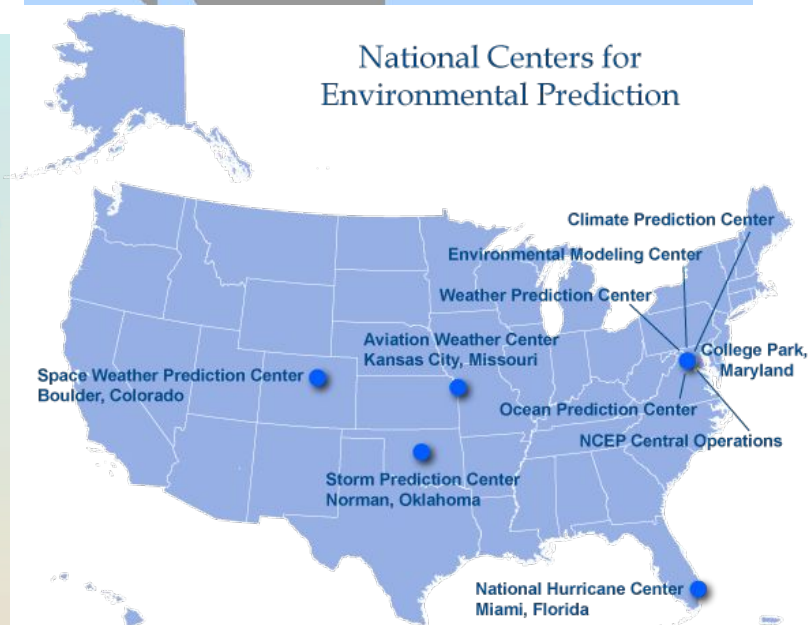
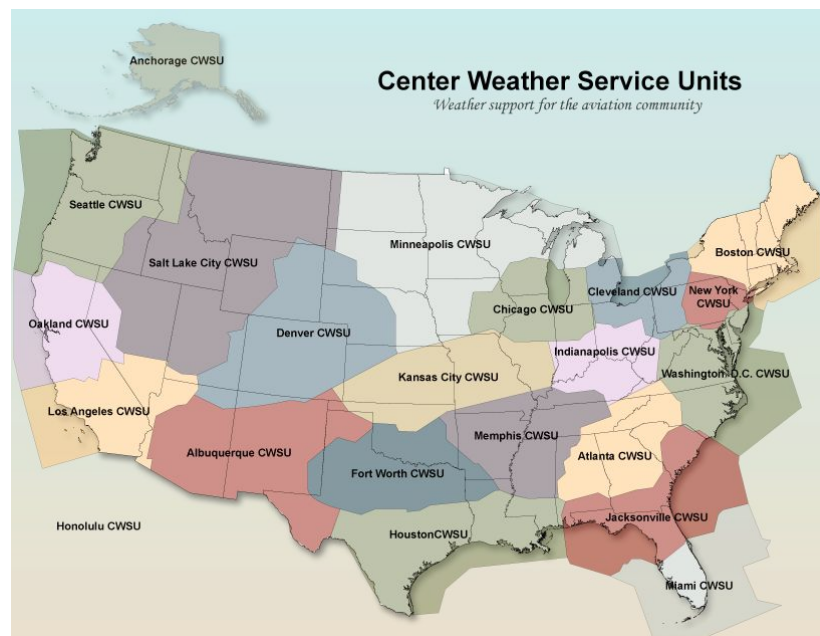
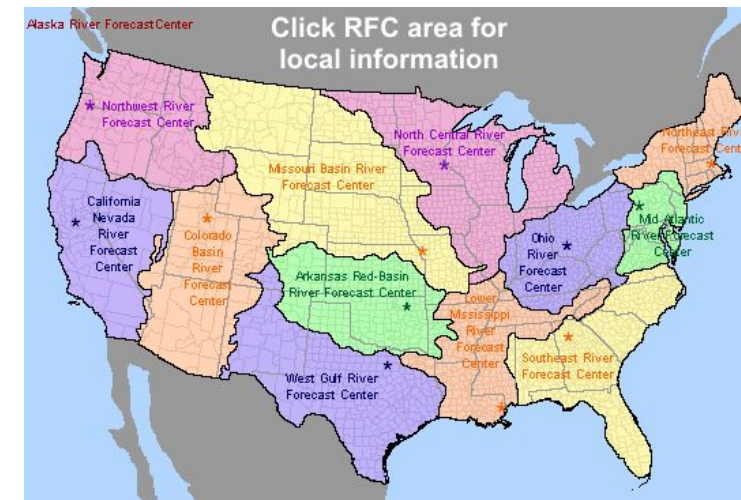
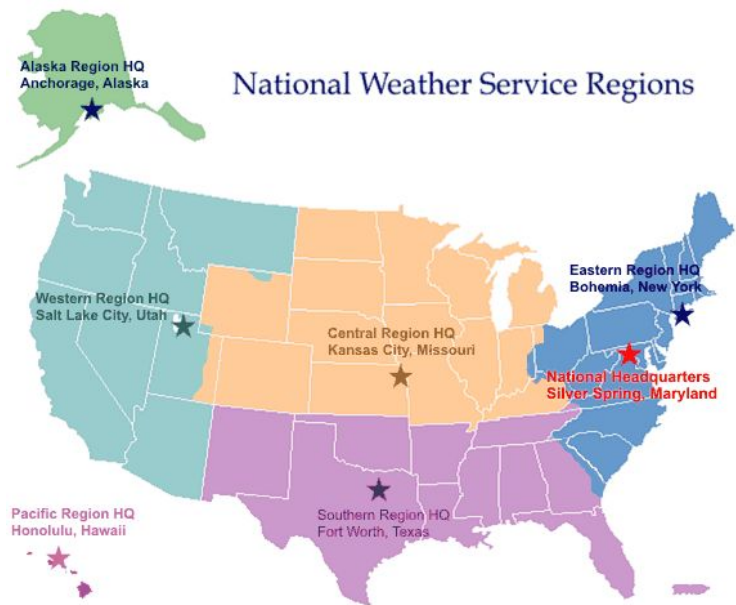
NWS Huntsville, AL

NWS Covers  
the ENTIRE  
country!

122 NWS offices



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the ENTIRE  
country!



# What Does a National Weather Service Meteorologist Do?

- Forecasts and Interprets the Weather
- Issues Warnings for Severe Weather
  - Hurricanes
  - Thunderstorms
  - Tornadoes
  - Lightning
  - Flooding
  - Winter weather (snow, ice)
- Researches Local Weather Impacts
- Works with Local Government Officials and the Public for Weather Awareness



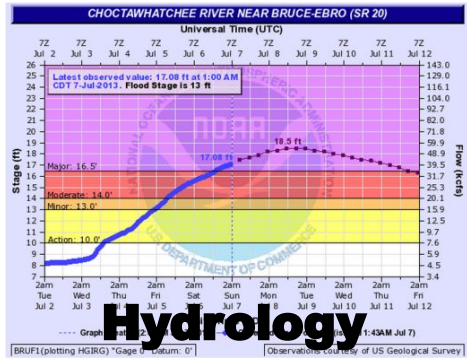


Current conditions at  
**Huntsville, Huntsville International / Joseph P. ...**  
Lat: 34.64°N Lon: 86.79°W Elev: 630ft.

Overcast  
**52°F**  
 11°C

Humidity 93%  
 Wind Speed N 12 mph  
 Barometer 29.91 in (1012.5 mb)  
 Dewpoint 50°F (10°C)  
 Visibility 10.00 mi  
 Wind Chill 48°F (9°C)  
 Last update 25 Mar 6:53 am CDT

More Information:  
[Local Forecast Office](#)  
[More Local Wx](#)  
[3 Day History](#)  
[Mobile Weather](#)  
[Hourly Weather Forecast](#)

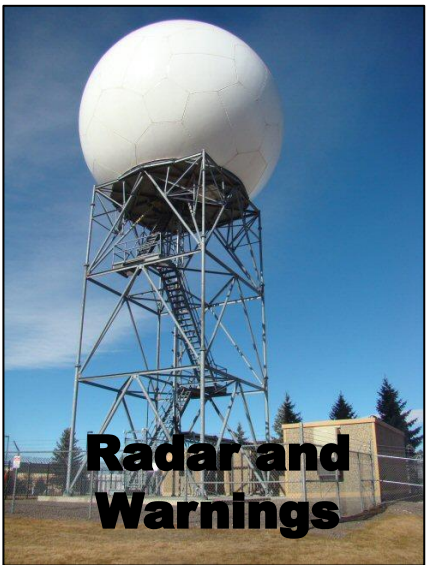
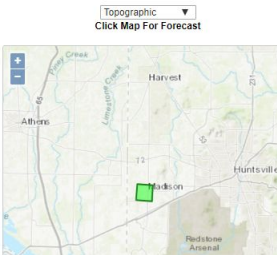


Extended Forecast for  
**2 Miles E Madison AL**

Today	Tonight	Thursday	Thursday Night	Friday	Friday Night	Saturday	Saturday Night	Sunday
Decreasing Clouds	Mostly Clear	Mostly Sunny	Partly Cloudy	Partly Sunny	Mostly Cloudy	30% - 60% Chance T-storms then Showers Likely	70% Showers Likely	Partly Sunny
High: 68 °F	Low: 50 °F	High: 80 °F	Low: 62 °F	High: 83 °F	Low: 65 °F	High: 78 °F	Low: 55 °F	High: 68 °F

Detailed Forecast

Today	Mostly cloudy, then gradually becoming sunny, with a high near 68. North wind around 5 mph.
Tonight	Mostly clear, with a low around 50. Calm wind.
Thursday	Mostly sunny, with a high near 80. South wind 5 to 10 mph.
Thursday Night	Partly cloudy, with a low around 62. South wind around 5 mph.
Friday	Partly sunny, with a high near 83. South southwest wind 5 to 10 mph.
Friday Night	Mostly cloudy, with a low around 65.
Saturday	A chance of showers and thunderstorms, then showers likely and possibly a thunderstorm after 1pm. Mostly cloudy, with a high near 78. Chance of precipitation is 60%.
Saturday Night	Showers likely and possibly a thunderstorm before 1am, then a chance of showers and thunderstorms after 1am. Cloudy, with a low around 55. Chance of precipitation is 70%.



## Information a Meteorologist Uses

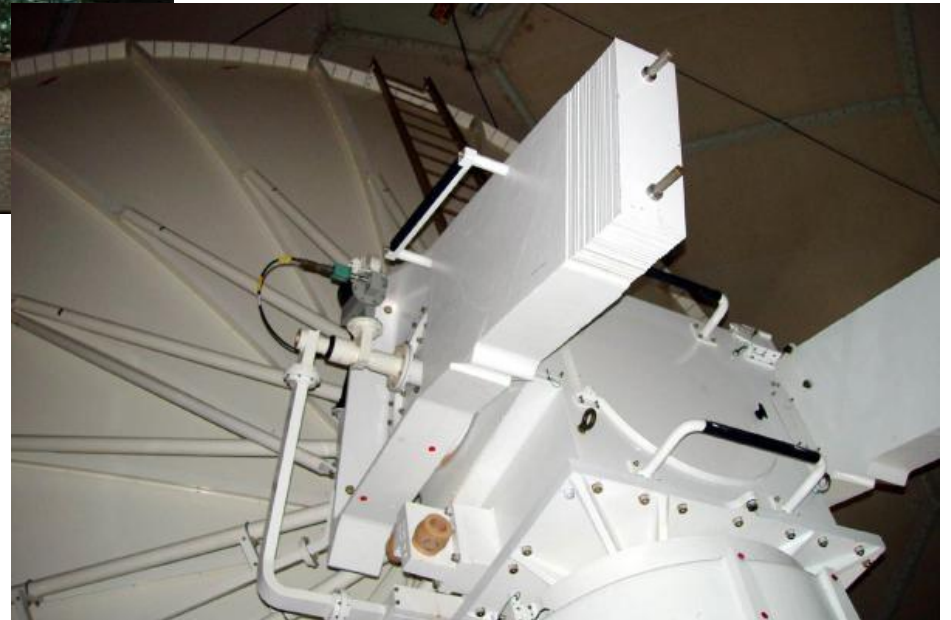
1. Weather Radar, Satellite
2. Measurements from Surface Weather Instruments
  - a) Thermometer, Barometer, Anemometer
3. Radiosondes Lifted by Weather Balloons
4. Computer Model Forecasts of Future Weather Patterns

# Weather Radar



Big hollow ball on  
the tower called the  
radome; made of  
rigid fiberglass

Inside the radome  
28-ft diameter dish





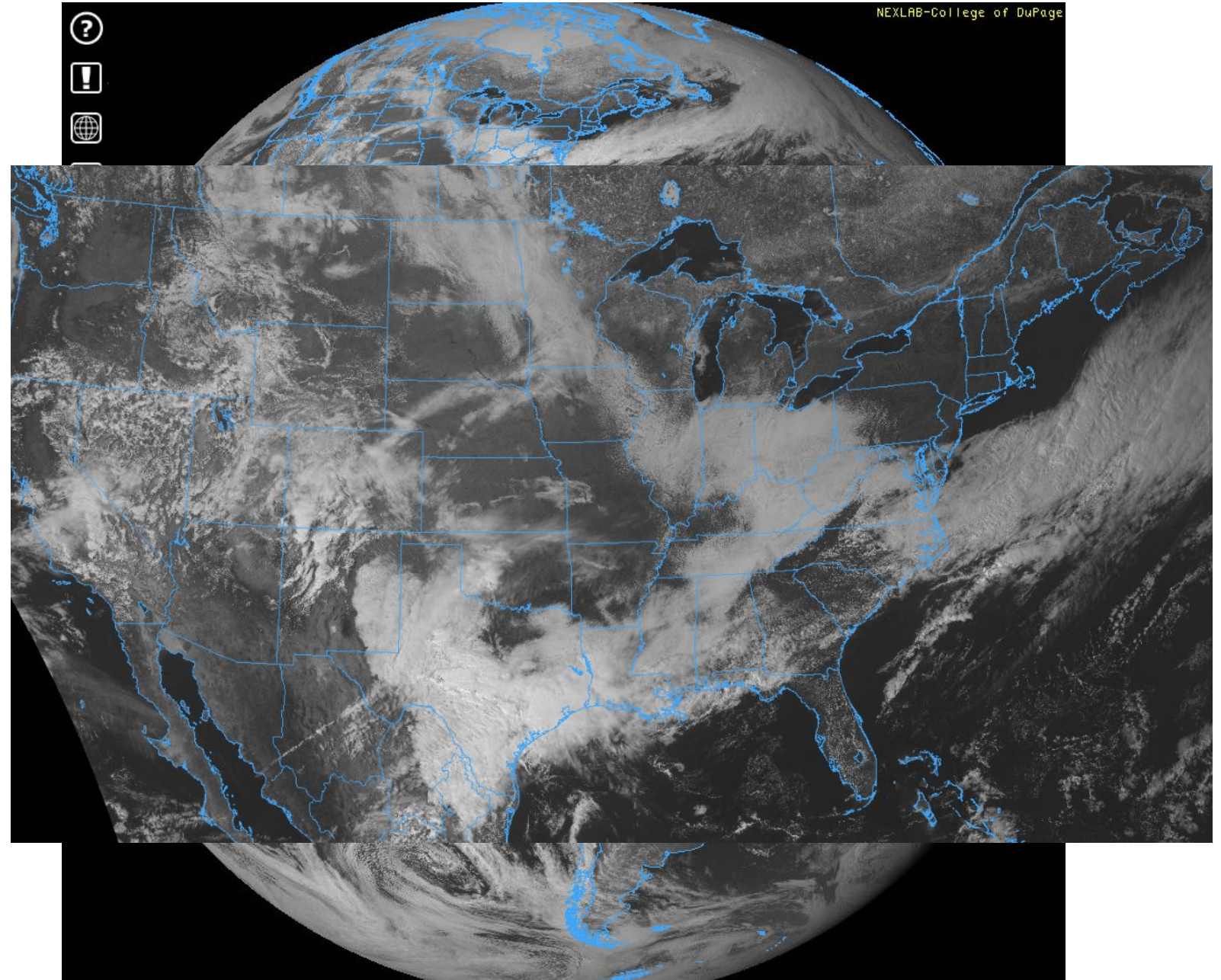
# Weather Satellites



GOES Satellite – Geostationary Operational  
Environmental Satellite, Altitude 22,300 SM



# Weather Satellites



# Weather Balloons

## 1. Fill up balloon





# Weather Balloons

1. Fill up balloon
2. Get ready to launch





# Weather Balloons

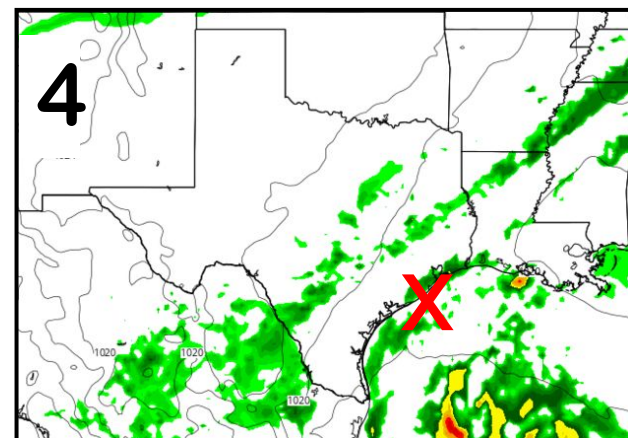
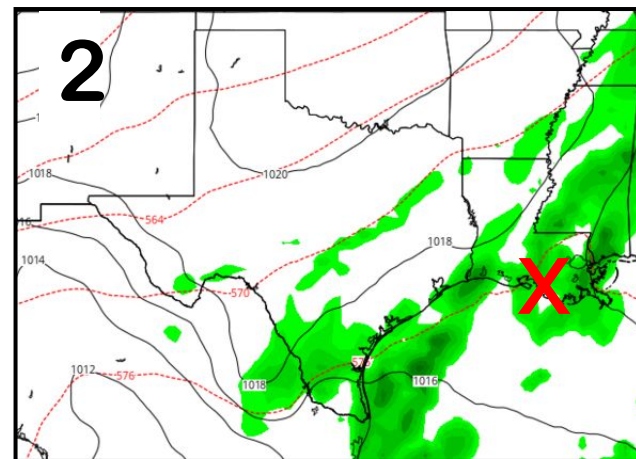
1. Fill up balloon
2. Get ready to launch
3. Up up and away



# Super-Computers



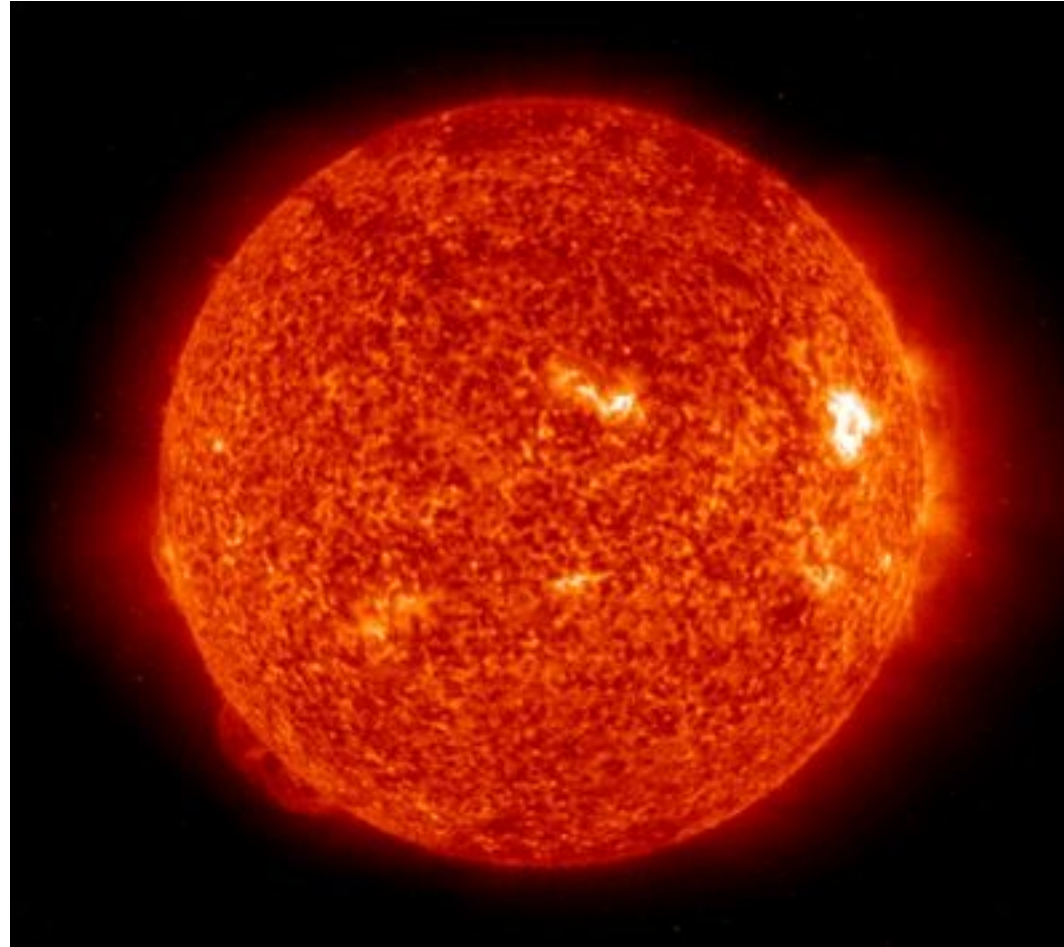
# Weather Models





# What Causes the Weather?

The **Sun** is where it all starts...



# The Sun Heats the Earth... The Earth Heats the Air

Incoming Solar Radiation  
passes through the atmosphere  
and is absorbed by the Earth's  
surface.

Outgoing Terrestrial Radiation  
is absorbed by the atmosphere.

Cold

Cool

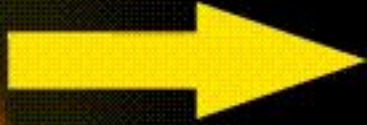
Warm





# Uneven Heating of the Earth

Oblique Rays (*Less Radiation Received*)



Vertical Rays (*More Radiation Received*)



Oblique Rays (*Less Radiation Received*)



**Equatorial Regions are Warmer** (*Higher Sun Angles*)

**Polar Regions are Colder** (*Lower Sun Angles*)

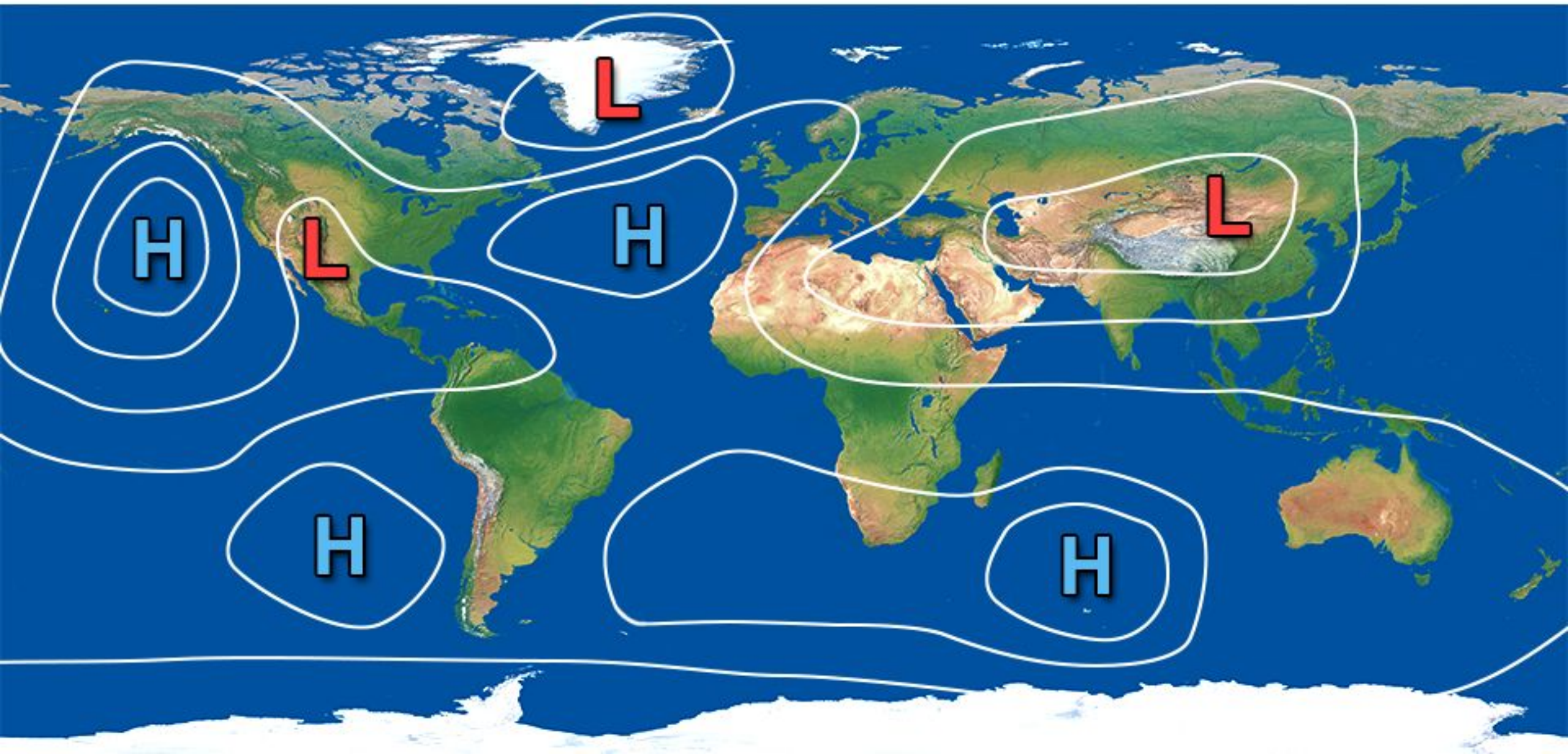


# Land & Water Heat Differently

- ✓ Land heats faster and to higher temperatures than water
- ✓ Land also cools faster and to lower temperatures than water



# Uneven Heating = Uneven Pressure Distribution





# Pressure & Wind

**Air moves from High to Low Pressure**

*Moving air is called "WIND"*

**H**

*High Pressure*

**COOL**



**L**

*Low Pressure*

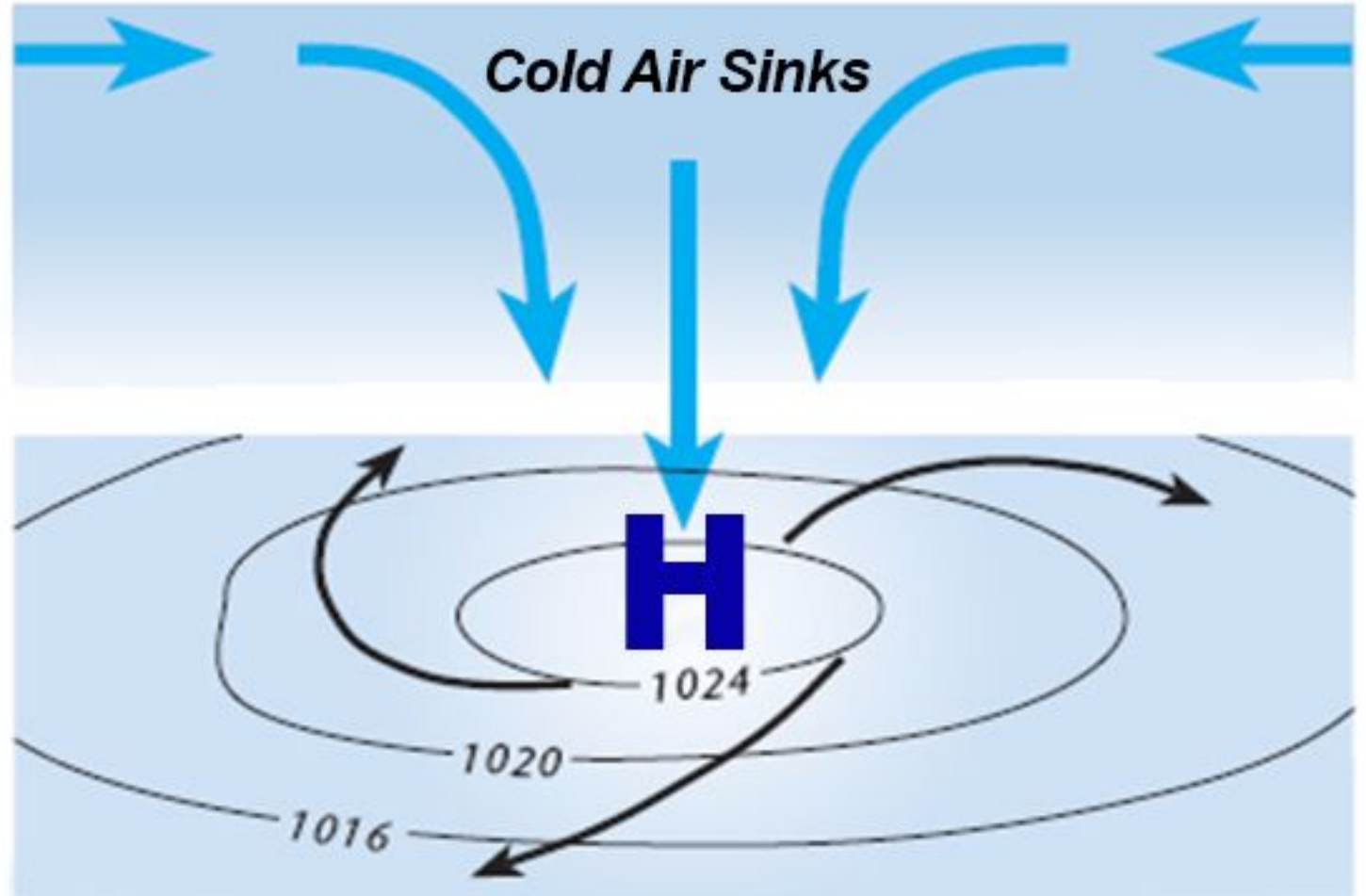
**WARM**



# High Pressure

**H** stands for “High Pressure” which brings... Happy Weather!

- ✓ Clear Skies
- ✓ Calm Conditions
- ✓ Dry Weather
- ✓ High Day Temps
- ✓ Low Night Temps

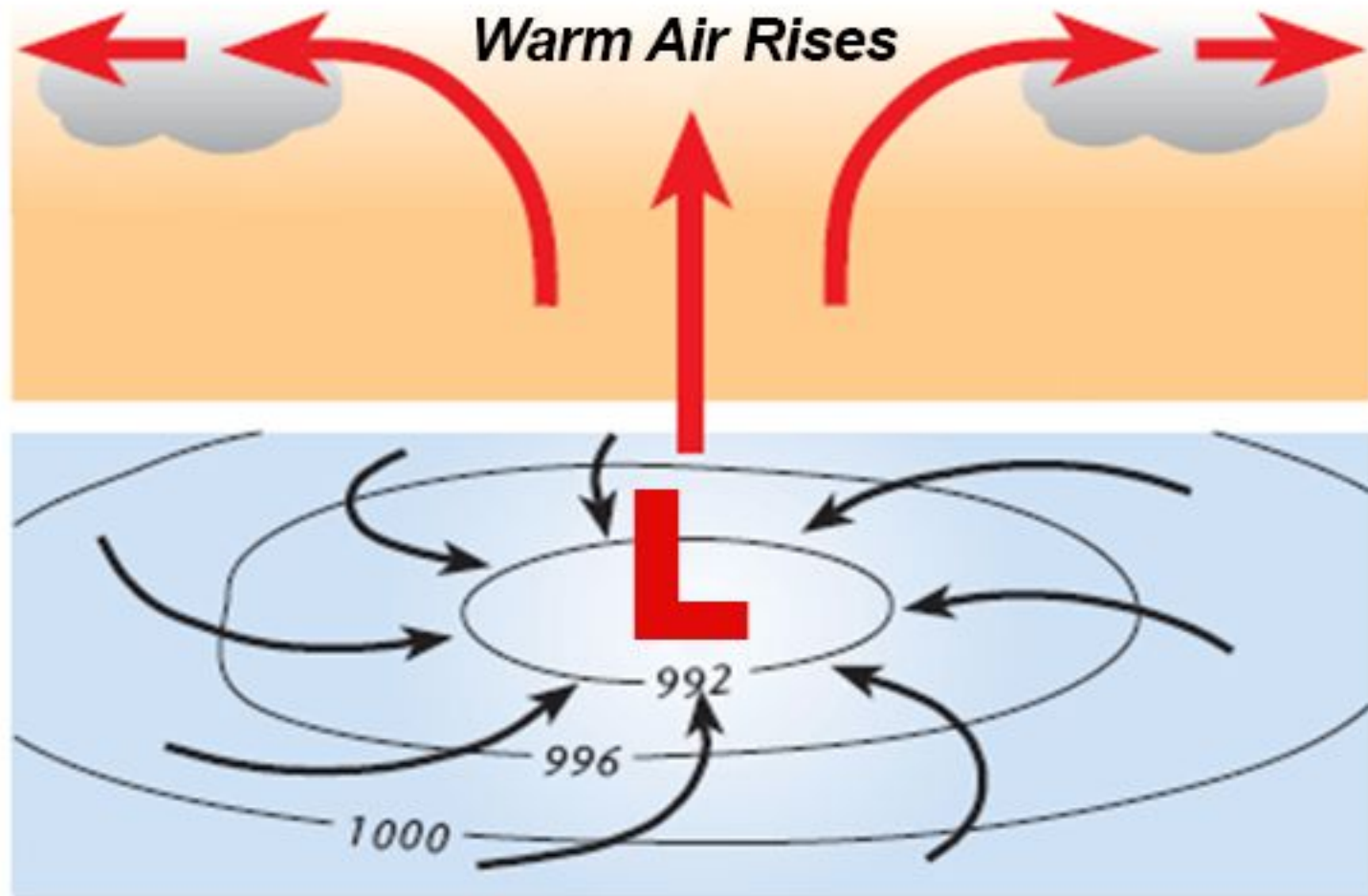


*Surface Winds Flow Outwards*

# Low Pressure

**L** stands for “Low Pressure” which brings... Lousy Weather!

- ✓ Cloudy Skies
- ✓ Windy Conditions
- ✓ Wet Weather
- ✓ Followed by colder weather



*Surface Winds Flow Inwards*



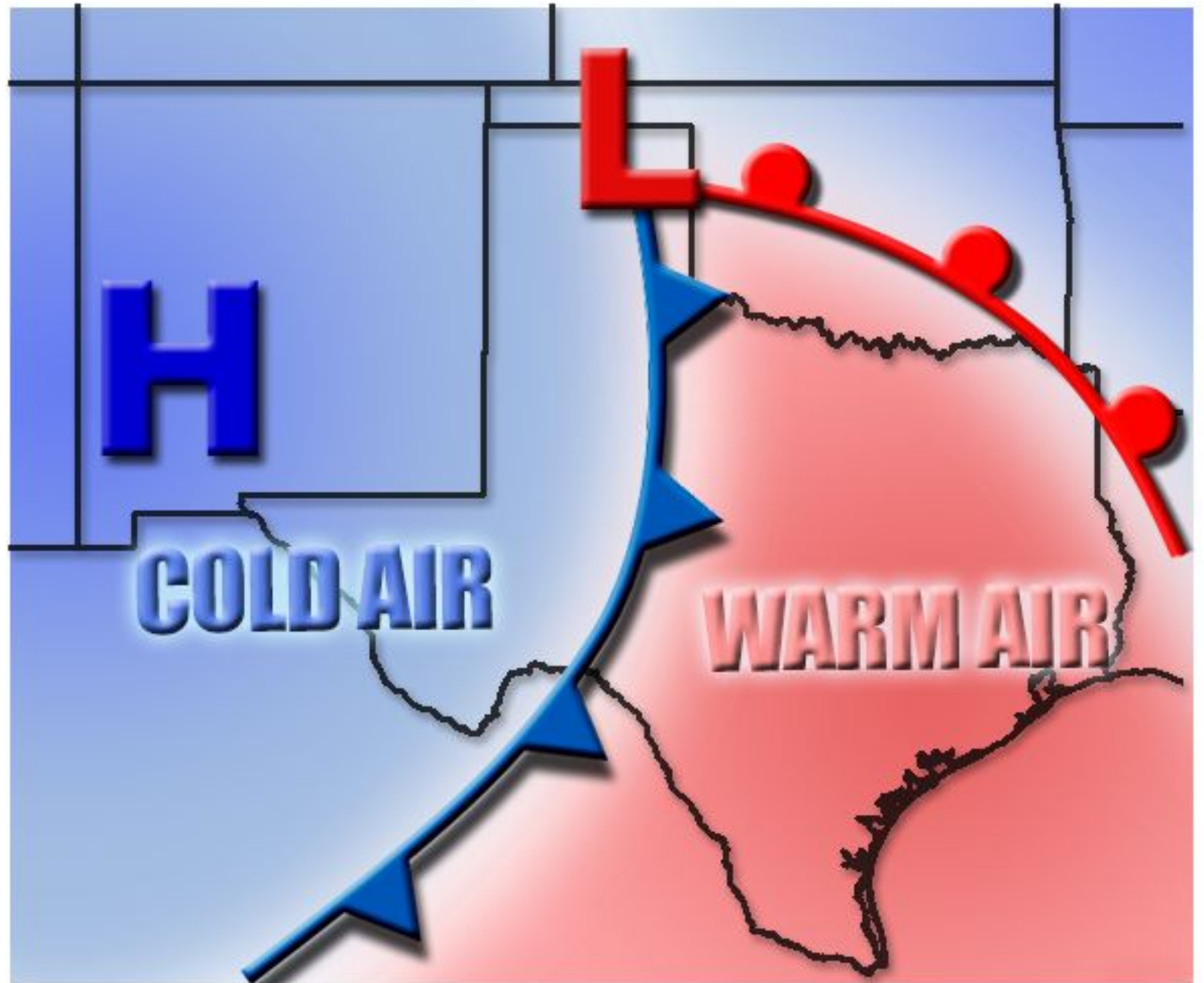
# Typical Weather Map

High Pressure

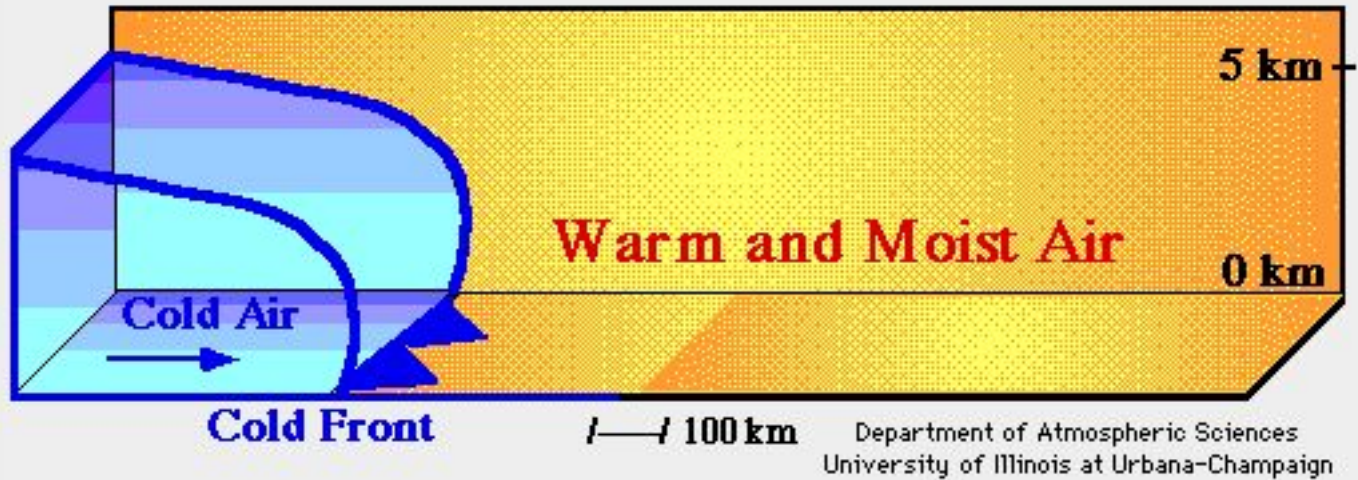
Low Pressure

Cold Fronts

Warm Fronts



# Warm and Cold Fronts



## Cold Front

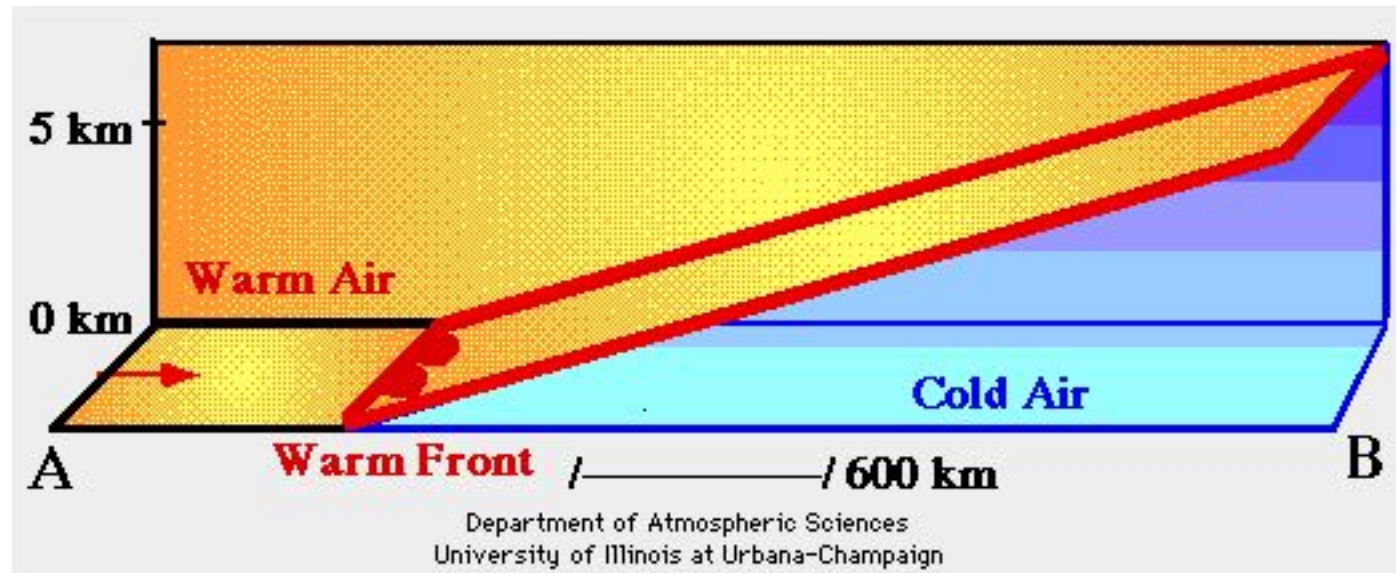
**Cold Air Displaces Warm Air  
At The Surface**

**Moves More Rapidly**

## Warm Front

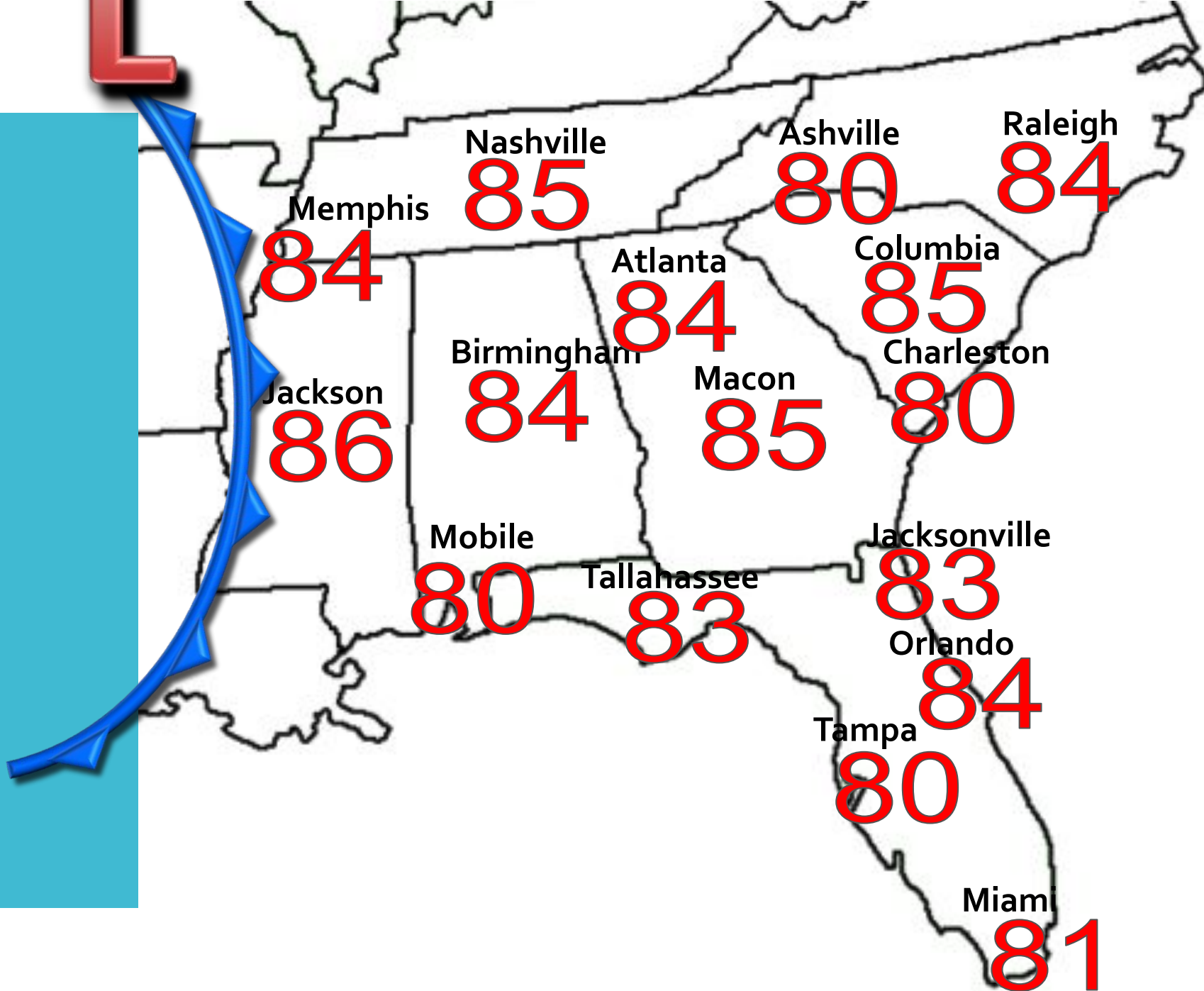
**Warm Air Displaces Cold Air  
At The Surface**

**Moves More Slowly**

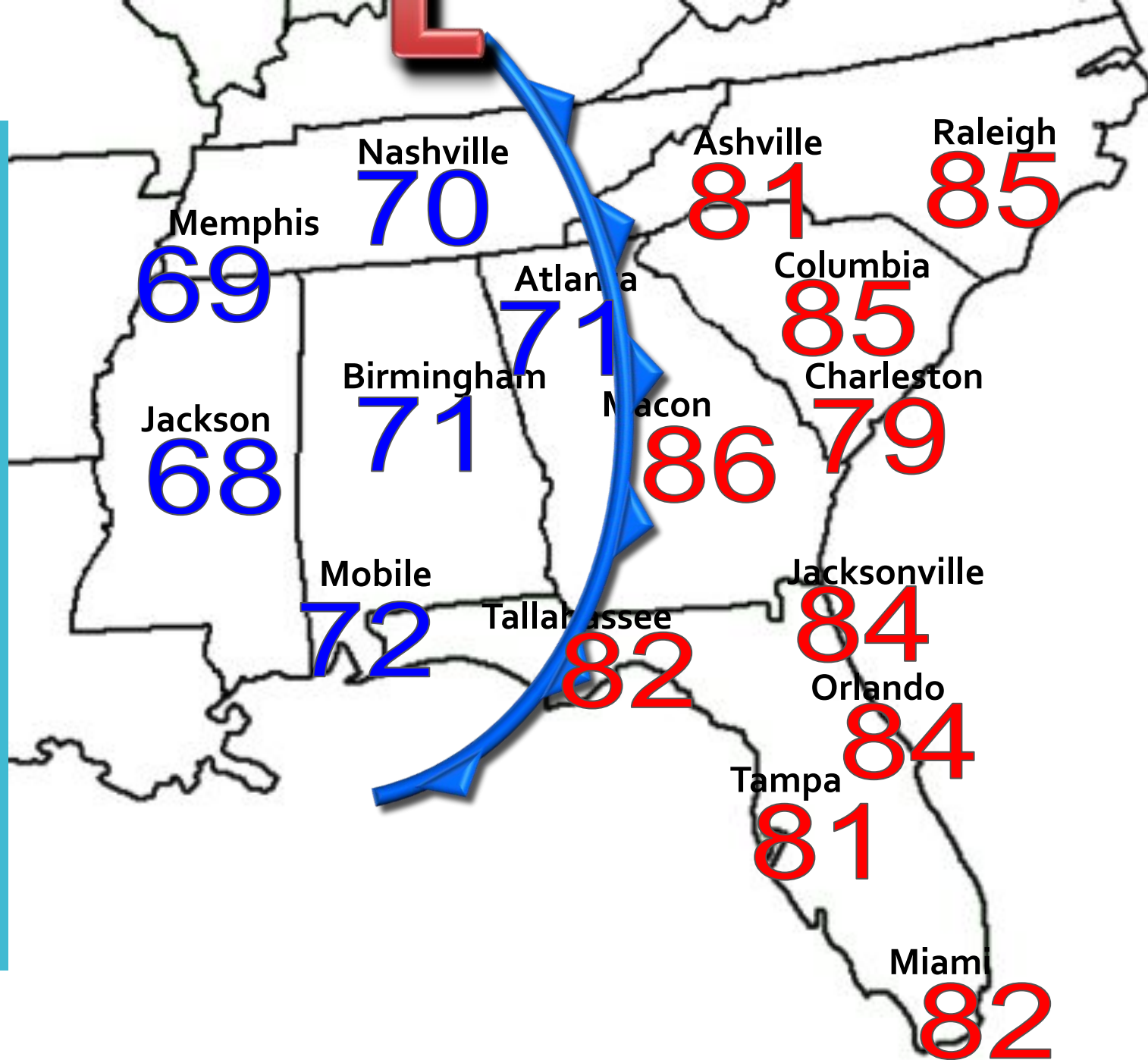




Monday

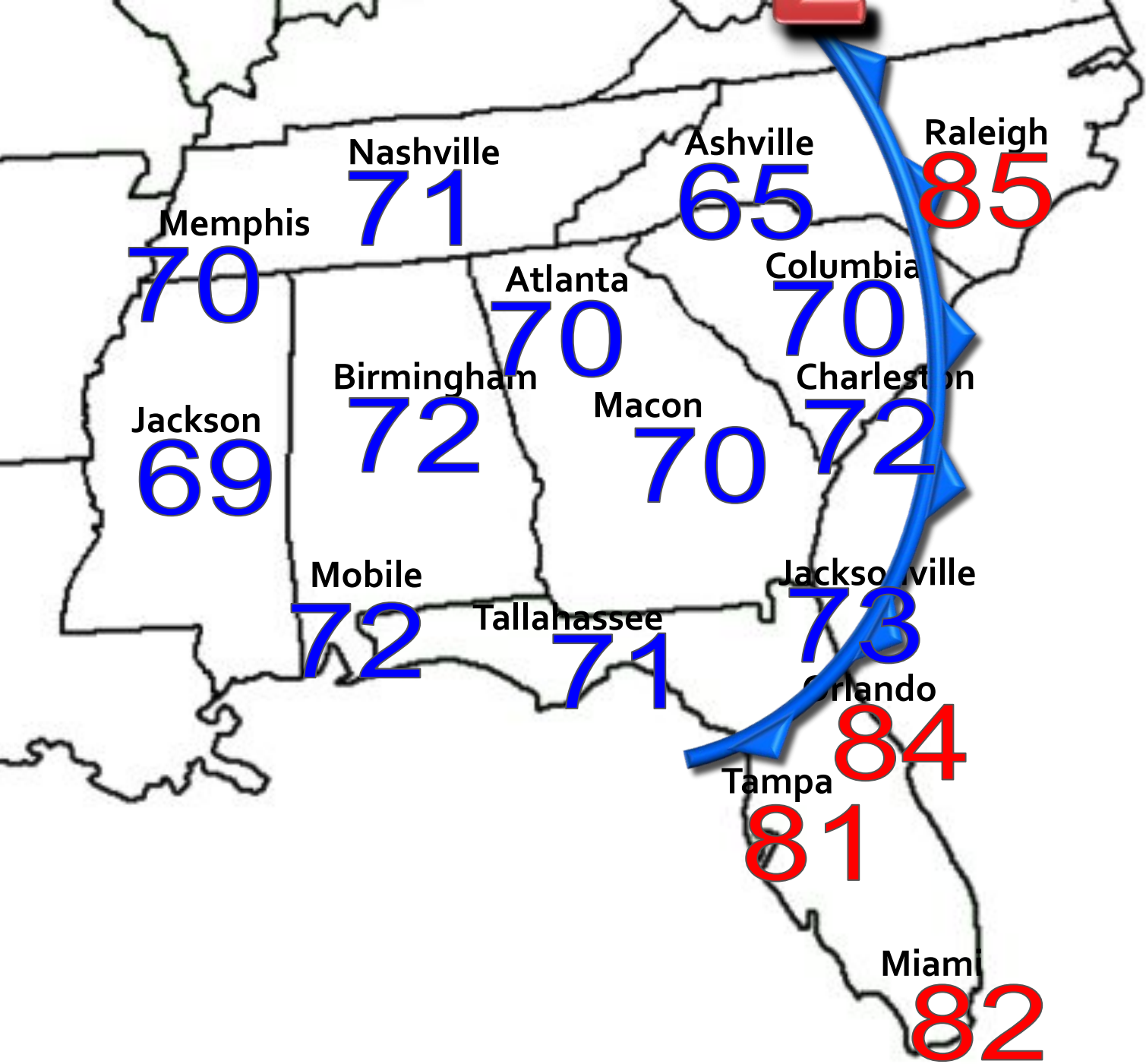


Tuesday

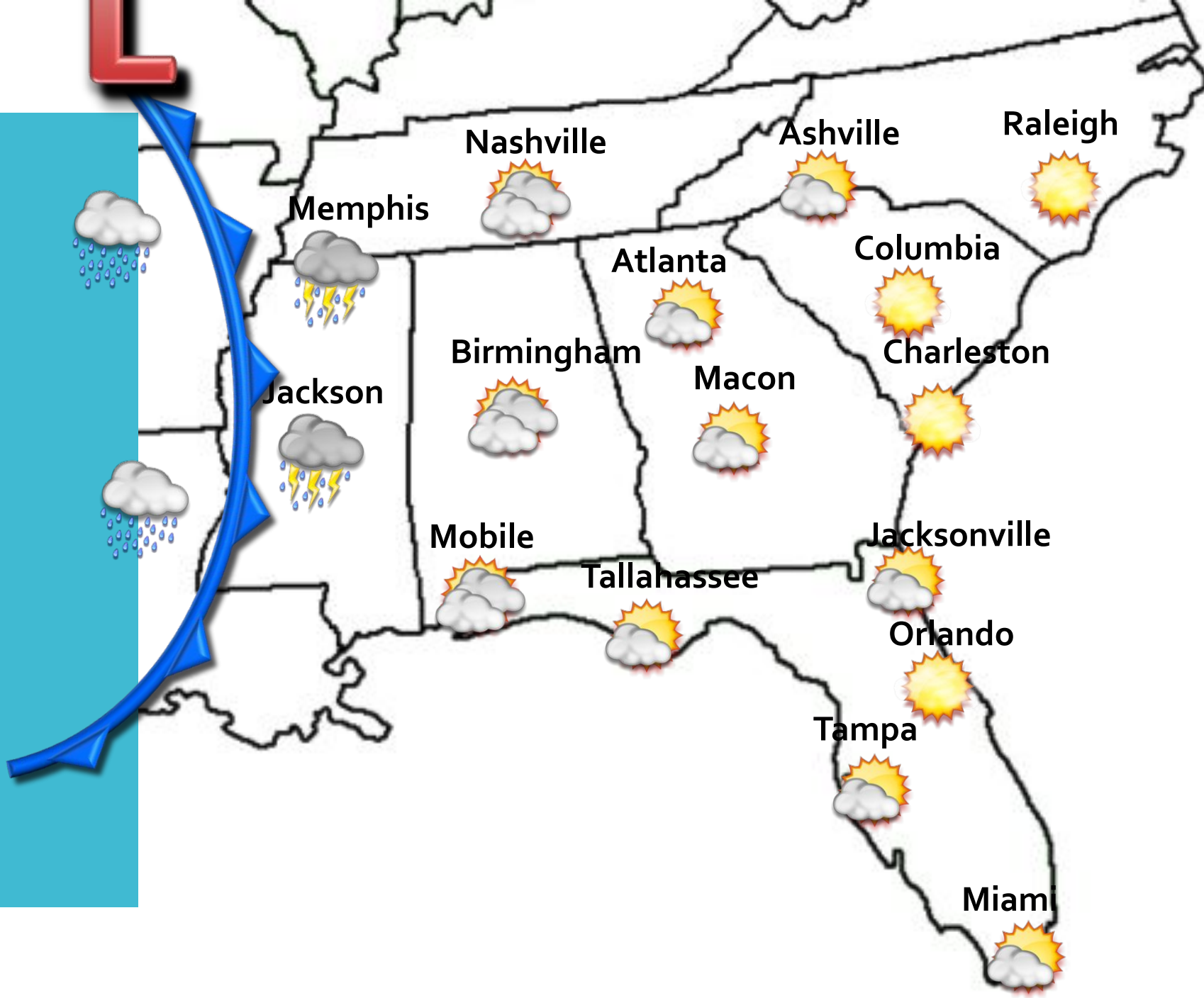




Wednesday



Monday





Tuesday



Wednesday

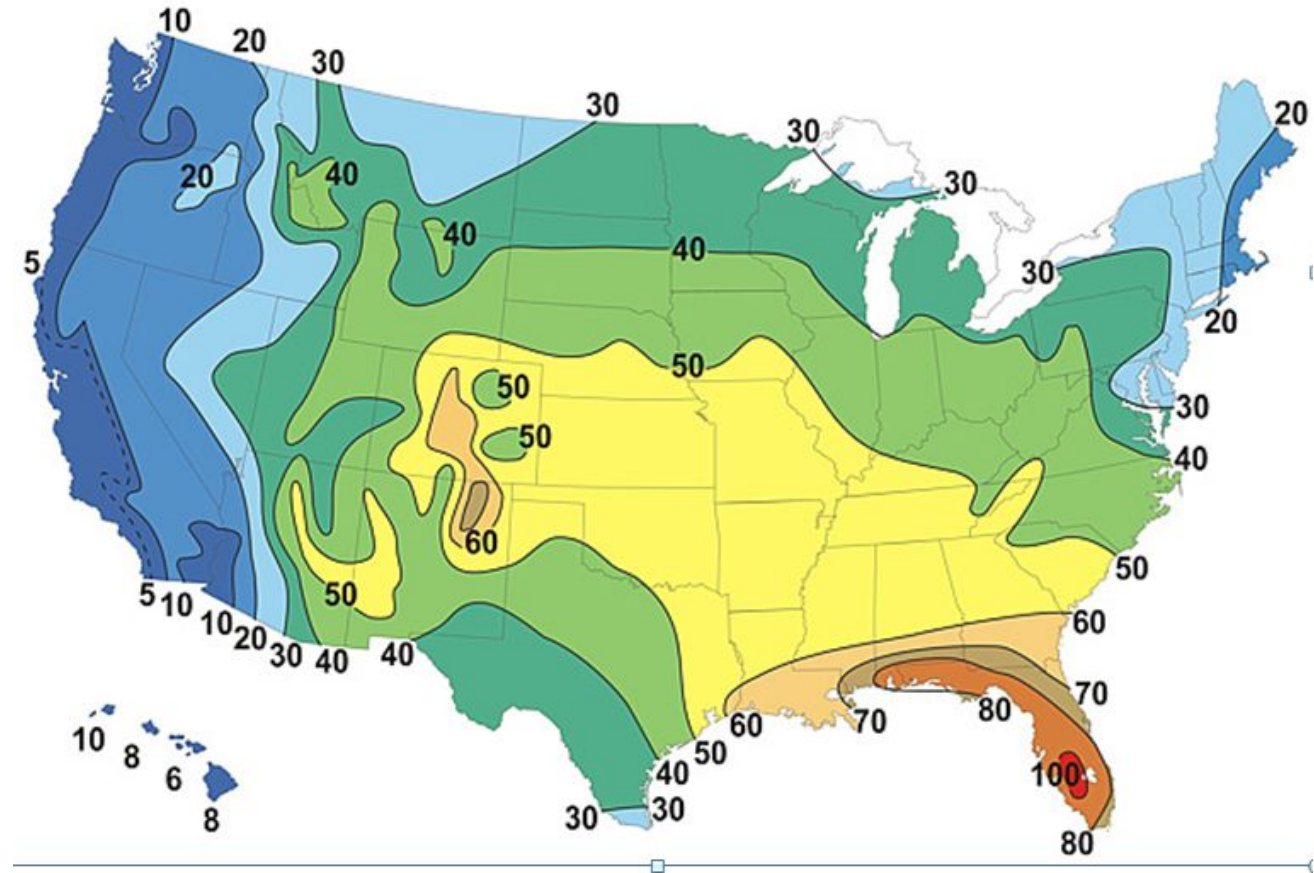




# Thunderstorms



# Average Number of Thunderstorm Days



# Severe Thunderstorms

- ✓ Hail 1 inch (quarter-size) or greater expected
- ✓ Winds at or over 58 mph (50kts)

-and / or-

- ✓ A tornado





Wind

## Thunderstorm Microburst

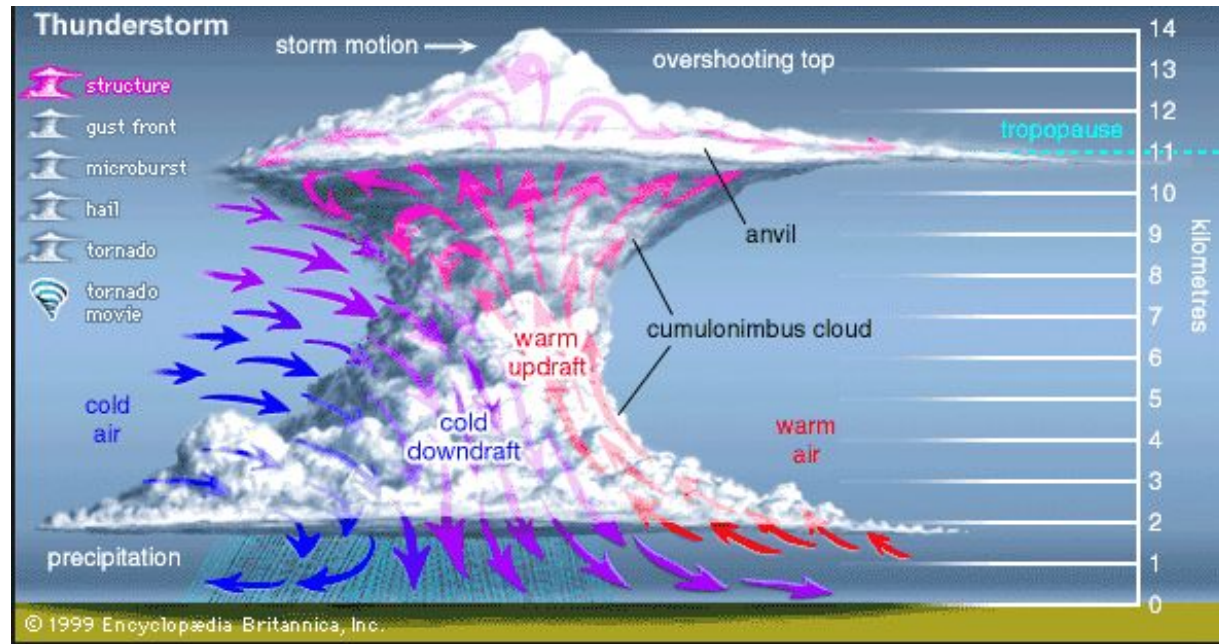
- ✓ Very Strong Winds
- ✓ Trees blown down
- ✓ Power lines knocked down
- ✓ Roofs damaged

<https://www.weather.gov/oun/events-20110614>

Wind



# Hail





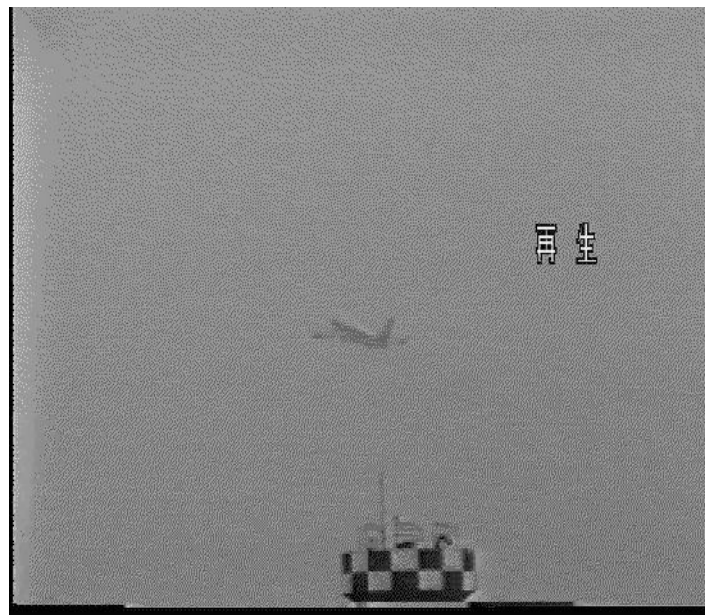
# Lightning



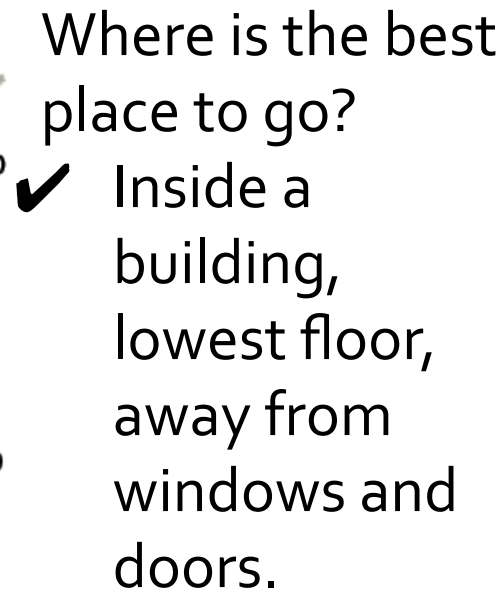
## Did you know?

- ✓ If you hear thunder, there is also lightning – even if you don't see it!!
- ✓ Go indoors and stay there for 30 minutes after the last time you hear thunder.
- ✓ Stay out of the pool or water! Even though it might not be raining, lightning can strike several miles away from the storm.

# Lightning and Vehicles



# Tornadoes







# EF Scale: Tornado Classification



# Good vs. Bad Shelters

Good



Bad



**STAY AWAY FROM WINDOWS!**



# FLOODING

Alabama's  
Severe  
Weather



# Flooding



- People can be swept away in just **6 inches of water**.
- It only takes 2 feet of moving water to sweep a car off a road.
- **Don't play in flooded streets.** There are ants, bugs, snakes, "pollution" in the water.







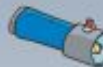
# Build Your Own DISASTER Supply Kit



Water



Canned Food  
& Snacks



Flashlight



Batteries



Battery  
Powered Radio



First Aid Kit



Artificial Ice



Ask a grownup to help you  
create your family's  
Disaster Supply Kit.



Portable Grill &  
Pans



Garbage Bags



All-Hazards  
Weather Radio



Pillow & Blanket



Tooth Brush and  
Tooth paste



Board Games/  
Toys/Books



Paper Plates  
and Cups



Small Fire  
Extinguisher



Paper Towels  
Toilet Paper



Scissors



Plastic Utensils



Compass  
/GPS Device

## My Supply Kit List



Important  
Papers



Emergency  
Contact List



Can Opener



Matches/Lighter  
in water proof bag



Raingear



Soap and Hand  
sanitizer



Local Map



Spare Glasses  
and Sun Glasses



Pet Care

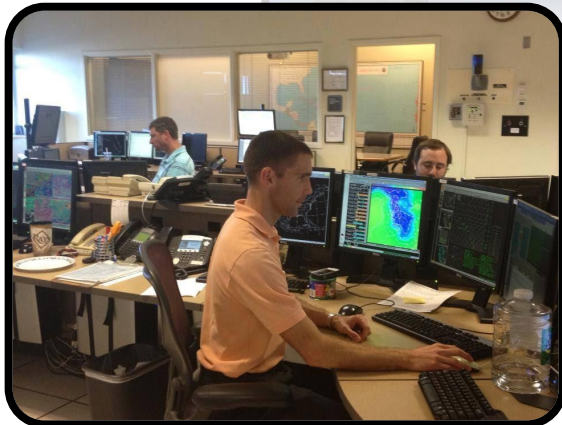
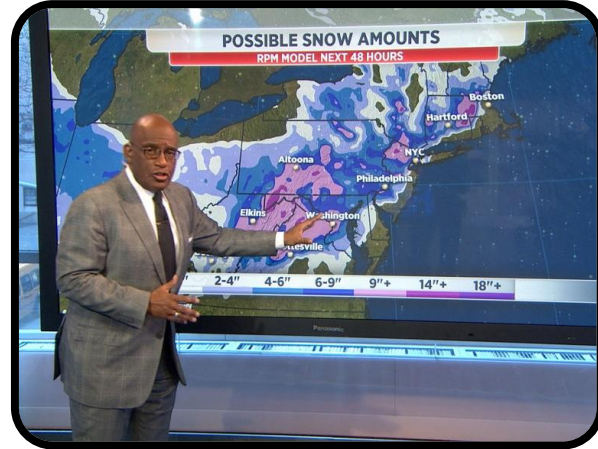


Baby Food



Tool /  
Tarps /  
Bucket with lid

# How to become a Meteorologist



# My background:

Bachelor of Science in Atmospheric Sciences:

**University of Louisiana Monroe**

Master of Science – Geographic Information Sciences:

**Northwest Missouri State University**

National Weather Service

1. Student Career Experience Program – NWS Shreveport
2. Meteorologist – NWS Birmingham
3. Lead Meteorologist – NWS Huntsville
4. Warning Coordination Meteorologist – NWS Huntsville



# How to become a Meteorologist

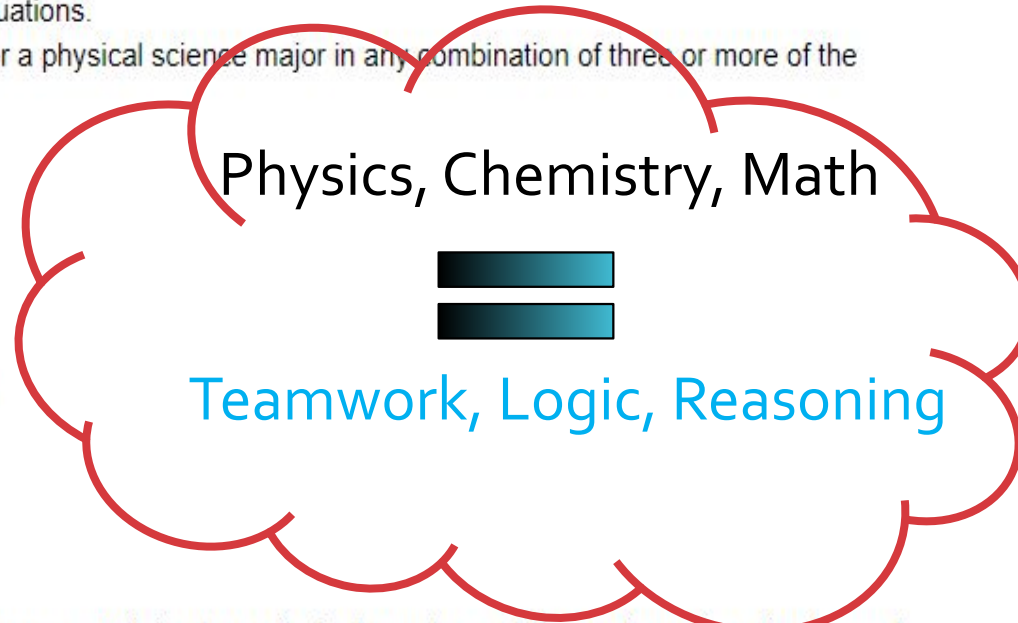
- Attend at least 4 years of college.
  - You must be very good at math and science.
- Talk and write well. Communication is key.
  - Lots of briefings!!
- Know to how stay calm and work through stress.

## Minimum Requirements

Degree: Meteorology, Atmospheric Science or other natural science major that included at least 24 semester hours (36 quarter hours) in meteorology/atmospheric science including:

- 6 semester hours in Atmospheric Dynamics \*
- 6 semester hours of analysis and prediction of weather systems (synoptic/mesoscale)
- 3 semester hours of physical meteorology; and
- 2 semester hours of remote sensing of the atmosphere and/or instrumentation.
- 6 semester hours of physics with at least one course that includes laboratory sessions. \*
- 3 semester hours of ordinary differential equations.
- At least 9 semester hours of course work for a physical science major in any combination of three or more of the following:
  - Physical Hydrology
  - Chemistry
  - Physical Climatology
  - Aeronomy
  - Computer Science
  - Advanced Electricity and Magnetism
  - Statistics
  - Physical Oceanography
  - Radiative Transfer
  - Advanced Thermodynamics
  - Light and Optics

\* Prerequisite or corequisite of calculus for course work in atmospheric dynamics and thermodynamics, physics and differential equations. Calculus courses must be appropriate for a physical science major.



# Why Become a Meteorologist?

- Direct role in keeping your community safe
- Tackle tough topics:
  - Climate change
  - Assessing vulnerable areas
  - Establish policy for a safer society
- Advance the science!
- Fun! New challenges every day.



# Thank you!!

Questions or comments?  
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